3400

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PLAN FOR THE TECHNICAL DIRECTION OF THE 1962 WESTERN HEMLOCK LOOPER CONTROL PROJECT IN OREGON

By

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FOREST SERVICE U. S. DEPARTMENT OF AGRICULTURE

THE HEMLOCK LOOPER

Lambdina fiscellaria lugubrosa Hulst

Figure 1

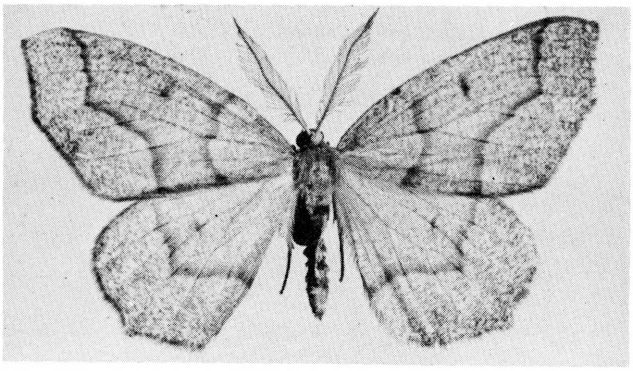

Figure 4

Figure 5

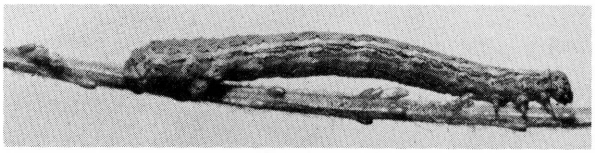

Figure 2

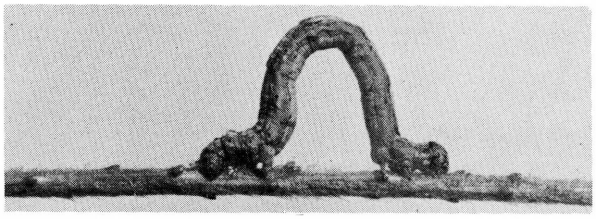

Figure 3

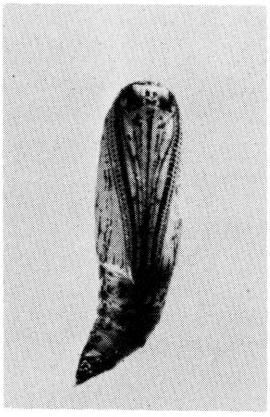

Figure 6

Figure 1. Western hemlock defoliated and killed by hemlock looper in Clatsop County, Oregon.
Figure 2. Caterpillar in extended position.
Figure 3. Caterpillar in looping position
Figure 4. Adult male.
Figure 5. Eggs.
Figure 6. Pupa.

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INTRODUCTION

A cooperative aerial spraying project recommended by the Northwest Forest Pest Action Council will be carried out on 33,000 acres of forest land in northwest Oregon in 1962. This plan sets forth the duties and responsibilities of technical personnel assigned to the project.

BACKGROUND

The western hemlock looper is a serious periodic defoliator of western hemlock, Douglas-fir, and Sitka spruce. During the past 75 years, five major epidemics have occurred in the spruce-hemlock forests along the coast of Oregon, Washington, and British Columbia. These periodic outbreaks have resulted in the destruction of vast amounts of timber. About 200,000,000 board feet of hemlock timber was destroyed in Pacific and Grays Harbor Counties, Washington, from 1929 to 1932. In the 1944 outbreak in Clatsop County, Oregon, 40,000,000 board feet of timber was killed outright and a great deal more was weakened as a result of partial defoliation. 1/

Early control was achieved by aerial application of lead and calcium arsenate dust. In 1945, DDT applied at the rate of one pound in two gallons of fuel oil per acre provided effective control at a much lower cost. 2/ Since then, methods of applying DDT have been improved on regional spruce budworm control projects and costs reduced.

CONTROL PLANS FOR 1962

The 1961 cooperative forest insect aerial survey recorded 11,000 acres of epidemic western hemlock looper infestations, all in Clatsop County, Oregon. 3/ The Northwest Forest Pest Action Council, at their October 27, 1961 meeting, recommended that this area be sprayed in 1962 to prevent wholesale timber losses. Subsequent ground surveys have shown that epidemic infestations cover a gross 32,749 acres.

1/ Keen, F.P. Insect Enemies of Western Forests. U.S. Dept. of Agric., Misc. Pub. 273, 280 pp.; illus. (rev.) 1952.

2/ Biennial Report of the State Forester to the Governor - July 1, 1944 to June 30, 1946. Oregon State Board of Forestry, Salem, Oregon.

3/ Buckhorn, W. J. and Orr, P.W. Important forest insect outbreaks in Oregon and Washington in 1961. U.S. Forest Service, R-6, 9 pp. Multilithed. October 20, 1961.

Land ownership is as follows:

Land Owner	Acres	Percent of total
Crown-Zellerbach Corp.	20,924	63.9
State of Oregon	6,662	20.4
Other Private	4,299	13.1
U.S. Government	327	1.0
Clatsop County	269	0.8
City of Astoria	268	0.8
Total	32,749	100.0

The proposed project is designed to protect valuable stands from serious losses until natural control factors can again become effective in reducing looper populations.

The 1962 project will be administered by the Oregon Department of Forestry. The U.S. Forest Service will direct and supervise the technical phases of the project.

RESPONSIBILITIES FOR TECHNICAL SUPERVISION

Technical phases of the 1962 project will be as follows:

Testing of Ingredients and Formulated Insecticide

The insecticide will contain one-half pound of technical grade DDT dissolved in 0.625 quarts of an auxiliary solvent diluted with #2 fuel oil to make one and one-half gallons. The chemical company formulating the insecticide will not be known until bids are closed and the contract awarded.

Arrangements will be made by the Forest Service to have the Division of Insecticide Investigations, Agricultural Research Service, Yakima, Washington, perform the following services:

1. Test ingredients to be used in formulating the insecticide.

2. Test samples of each formulated batch to insure compliance with contract specifications.

3. Inspect the plant of the successful bidder, if requested by the Oregon Department of Forestry.

Personnel of the Forest Service and Oregon Department of Forestry will witness the sampling of each batch of formulated insecticide and collect and mail one-pint samples to the Agricultural Research Service laboratory at Yakima, Washington, for analysis. When the analysis has been made, the contracting officer will be advised of the amount of DDT per one and one-half gallons. The contracting officer will then notify the insecticide contractor's chief chemist. If the batch meets the contract specifications, it

will be released for transportation to the airstrip. If the batch does not meet specifications, more DDT will be added and another sample taken and analyzed before the batch is released.

Conduct of Biological Phases

The Insect and Disease Control Branch, Division of Timber Management, Regional Office, U.S. Forest Service, will be responsible for all biological phases of the 1962 Western Hemlock Looper Control Project. The responsibilities of this Branch will be as follows:

1. Provide survey data upon which control decisions can be based.

2. Participate in control planning.

3. Provide guidelines and procedures to insure the biological soundness of control operations.

4. Train technical personnel who will act as biologist, assistant biologist, and insect checkers.

5. Inspect the operational procedures for entomological soundness.

7. Prepare technical reports as needed.

TECHNICAL PERSONNEL

The technical advisor will be responsible for the technical or entomological phase of the Western Hemlock Looper Control Project. One biologist, one assistant biologist, and three insect checkers will be needed to conduct the biological phases. The biologist and assistant biologist will be U.S. Forest Service personnel but will be financed from project funds. The three insect checkers will be hired and financed by project administration. These men will be trained by and responsible to the biologist.

Project Director - A.T. Larsen, Director, Insect and Diease Control, Oregon Department of Forestry, will be responsible to the State Forester for the direction and supervision of all phases of the 1962 project.

Technical Advisor - P.W. Orr, Entomologist, will be the principal U.S. Forest Service representative on the project. He will be directly responsible to Benton Howard, Chief, Insect and Disease Control Branch of the Division of Timber Management, Regional Office, for the field direction of the biological phases of the project. The technical advisor's principal duties will be:

1. To represent the contracting officer in matters concerning the biological phases of the 1962 project.

2. To supervise and be responsible for the work of the biologist, assistant biologist, and insect checkers.

3. To compile and interpret entomological data collected by the biologist, assistant biologist, and insect checkers.

4. To report on the entomological phases of the 1962 control project.

Biologist - The biologist assigned to the 1962 project will be directly responsible to the technical advisor. He will report for duty about the middle of May 1962 and will receive instruction regarding his duties. The duties of the biologist will be:

1. To work cooperatively with all project personnel.

2. To become thoroughly familiar with each control unit--maps, mosaics, roads, trails, boundaries, elevations, and spray blocks.

3. To select sampling spots for twice-weekly examinations and collections by insect checkers.

4. To instruct insect checkers in methods of making daily larval examinations.

5. To determine rates of larval development daily.

6. To keep accurate records of larval development.

7. To submit a weekly report of larval development by control unit to the technical advisor.

8. To advise the project director of the rate of larval development and help him decide when spraying will begin, so that aircraft can be ordered to the airstrip in time for inspection, instructions, etc. Form R6-5240-31 will be submitted to the project director stating spraying priorities.

9. To keep accurate records of blocks or portions of blocks released for spraying, progress of spraying, and to make periodic contacts with the technical advisor regarding spraying priorities.

10. To plan and direct field studies to determine larval mortality resulting from spraying.

Assistant Biologist - The assistant biologist will report at the 1962 Western Hemlock Looper Control Project headquarters in Astoria on June 4. He will be trained and supervised by the biologist and will be directly responsible to him.

The duties of the assistant biologist will be:

1. To take charge of the technical aspects of the project during

the absence of the technical advisor and biologist.

2. To become thoroughly familiar with the boundaries of the control units and the roads and trails in each spray block.

3. To assist the biologist in instructing the insect checkers in methods of making daily larval examinations and collections.

4. To assist the biologist in determining the rates of larval development and keeping daily records.

5. To assist the biologist in establishing pre-spray and post-spray mortality sampling points.

6. To supervise the insect checkers in laying out spray deposit cards.

7. To confirm all communications--radio messages, telephone conversations, verbal reports, etc.--in writing.

Insect Checkers - Three insect checkers will be needed for the control project. They will report to the biologist about the first of June 1962. Transportation for these men will be provided by the Oregon Department of Forestry. The duties of the insect checkers will be:

1. To work cooperatively with all project personnel.

2. To become familiar with their control units.

3. To make daily collections and examinations of hemlock looper larvae.

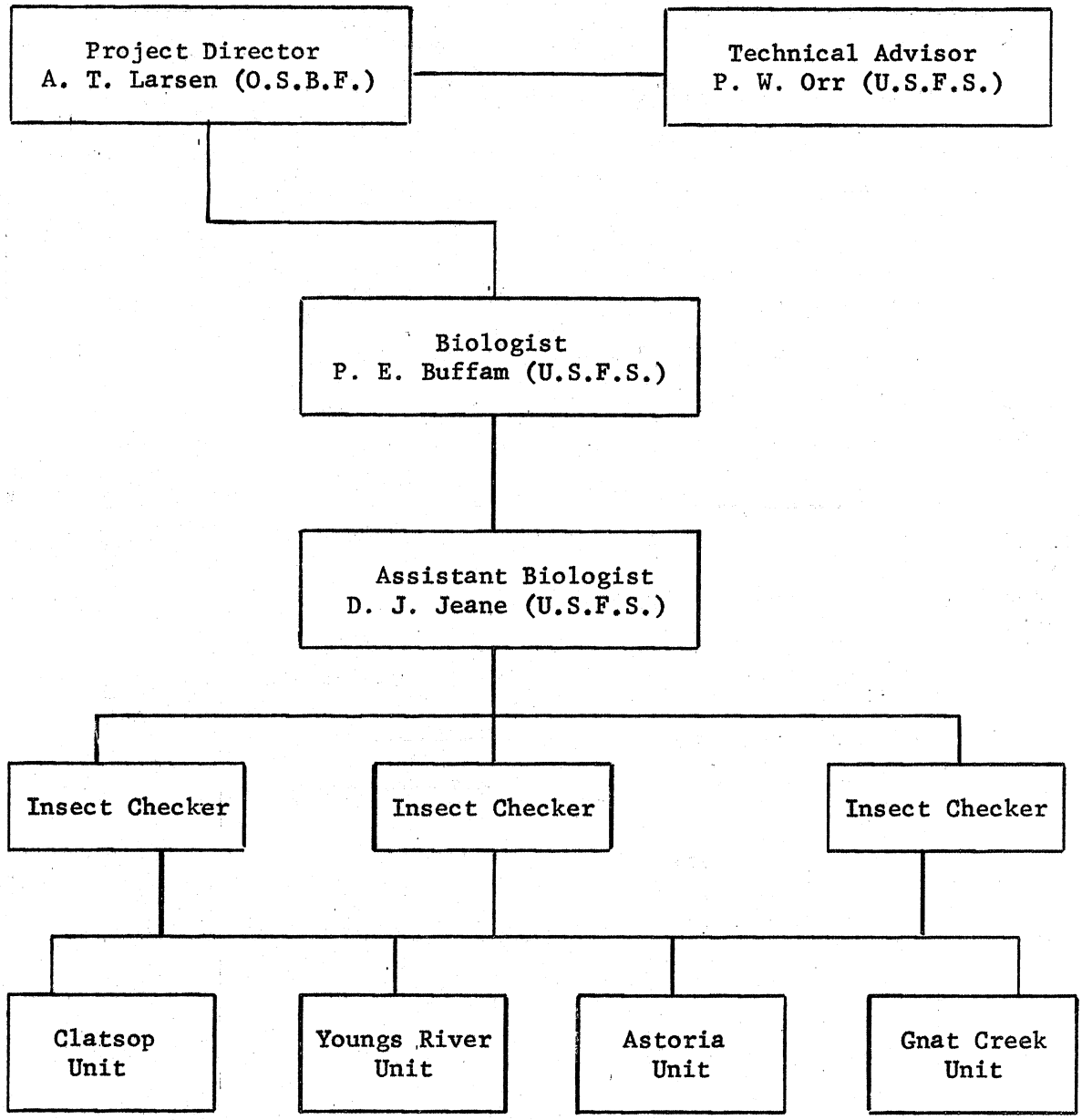
4. To deliver the collections to the biologist or assistant biologist at the end of each day.

5. To assist in establishing pre-spray and post-spray mortality lines as instructed by the biologist.

6. To lay out spray deposit cards.

7. To observe performance of spray planes whenever possible.

TECHNICAL ORGANIZATION CHART FOR THE
1962 WESTERN HEMLOCK LOOPER CONTROL PROJECT



Larval Collections Pior to Spraying

The rate of larval development will be determined by larval collections made twice-weekly at each collection point selected by the biologist. Larvae will be collected from understory plants and on hemlock lower boles to trace the upward movement (migration) of the loopers. Larval development, determined by head width measurements, will be used as supplementary information. Initiation of spraying operations in each spray block depends upon these important determinations.

The procedures for making larval collections and examinations will be as follows:

1. The biologist and assistant biologist will determine as closely as possible the date on which egg hatch begins in each spray block. In past years, hatching has occurred from May 1 to June 15.

2. The biologist will select representative collection points within each control unit.

3. The biologist and assistant biologist will keep a record of the collecting points and their locations.

4. Twice-weekly larval collections and counts will begin around the first of June when most of the eggs have hatched.

5. At each collection point, two types of information will be obtained:

    a. At least three collection points will be selected in each control unit. At each point, five sample trees will be selected. A three-inch strip of tanglefoot will be applied to the circumference of each tree at a point four feet above the ground. A strip of tanglefoot, six inches long, will be marked off on the north, east, south, and west sides of each tree. Twice-weekly the looper larvae will be counted and collected from these six-inch areas and preserved in alcohol. Date of collection, control unit, collection point number, tree number, and collector's initials will be placed on a label inside each vial. This information is very important to the biologist and assistant biologist. Larvae should be counted at the time of each collection and the number placed on Form R6-5240-31.

    b. At the same time part (b) is accomplished, five branches of understory plants on each plot will be sampled by beating the larvae onto a beating sheet 3' x 3' held under each branch. The larvae will be counted and the number recorded on

Form R6-5240-31. These larvae should be placed back on the plants in the area so that counts will not be altered at the time of the next collection. Since looper larvae are probably phototropic, each sample at a particular plot should be collected at the same time of day.

6. Larval collections and collection records should be turned over to the biologist or assistant biologist the same day they are collected or by the next morning.

Release of Spray Blocks

To effectively control the western hemlock looper, DDT insecticide must be applied at the time when most of the larvae have reached the lower and mid-crown levels of the conifers. Control will not be effective if spray is applied when most of the looper larvae are on understory plants, because very little insecticide can filter all of the way through the overstory and reach the ground. The best time for aerial application of DDT for hemlock looper control is thought to be from mid-June to mid-July.

The following guides will be used by the biologist to determine the start of spraying:

1. Comparison of the number of looper larvae on the hemlock boles and from the beatings at each collection point from one collection time to the next will be the main basis for determining when a spray unit is ready for spraying.

2. When looper larvae begin migrating from the understory plants to the overstory western hemlock, Douglas-fir, and Sitka spruce foliage, the project director will be notified. The biologist and project director will then decide the approximate starting date of spraying so that spray planes can be ordered to the airstrip in time for inspection, instructions, etc.

3. When the number of larvae on the hemlock boles has increased and the number on understory plants has decreased, the block will be released for spraying. This period of migration should occur over an extended period of time and when most of the larvae are in the second instar. When blocks are released for spraying, Form R6-5240-35 will be filled out by the biologist and submitted to the project director. Spring priorities will be listed on this form.

4. The biologist will follow western hemlock looper larval development at a field rearing station to supplement information gathered at the collection points.

5. The biologist will meet with the project director daily to discuss insect development, spraying priorities, progress of control operations, and respraying possibilities.

Mortality Plots

The biologist will select at least one plot in each of the spray blocks in the project area to determine western hemlock looper mortality. These plots will be established and sampled one or two days before spraying is begun in a block and within three to ten days after spraying.

The following procedures will be followed for sampling larval mortality resulting from aerial spraying:

A. Before Spraying

1. The biologist will choose at least one three-tree mortality plot in each block in the spray area. Plots should be evenly distributed throughout the entire spray project area.

2. One or two days before a block is to be sprayed, the mortality plot in this block will be sampled. Four 18" twigs will be clipped from each of the three trees on the plot. Each twig will be carefully examined for western hemlock looper larvae and pupae. The life stages on each twig will be counted and the number recorded on Form R6-5240-34 and collected and preserved in alcohol.

3. The biologist or assistant biologist will determine the number and percent of larvae from these collections in each instar and record this data on Form R6-5240-33.

4. The biologist will keep an accurate record of the location, establishment date, and pre- and post-spray sampling dates of each mortality plot.

B. After Spraying

1. Within three to ten days after a block has been sprayed, the mortality plot will again be sampled in the same way it was before spraying and the data will be recorded on Form R6-5240-34.

2. When Form R6-5240-34 has been completed for each plot, the biologist will compute western hemlock looper mortality resulting from spraying by using the following formula:

$$\% \text{ Mortality} = \frac{\text{Pre-spray count} - \text{Post-spray count}}{\text{Pre-spray count}} \times 100$$

Spray Deposit Cards

All sensitive spray deposit cards will be used to indicate spray coverage. These cards will be used in the following manner:

1. Ten spray cards will be placed at each mortality plot the day before the plot is to be sprayed. Four cards will be placed on the upwind side of the plot, four on the downwind side, and two at the plot center. (Prevailing winds are from the west in the spray project area.)

2. The insect checkers will be responsible for placing the spray cards when they sample the mortality plots. Cards should be placed in a clear, open spot not overtopped by vegetation. In some cases, cards will have to be placed on stakes or wires to keep them clear of the ground cover.

3. Spray deposit cards will be placed randomly at the edge of lakes, reservoirs, and spawning streams and in pastures and other critical areas to check spray drift.

4. Within two days after an area has been sprayed, the insect checkers will gather the spray cards, label them as to location on the plot (i.e., upwind, downwind, center), and turn the cards in to the biologist or assistant biologist. The randomly placed spray cards will be consecutively numbered according to control unit and spray block.

5. The biologist or assistant biologist will examine the spray deposit cards using a spray deposit card index from Agricultural Research Service in Beltsville, Maryland to determine whether spray deposit was adequate. In cases of inadequate coverage, the biologist will check larval mortality on the area in question and notify the technical advisor that a respray is necessary. All spray deposit cards will be saved for futurereference.

Reports

The number of reports required during the 1962 Western Hemlock Looper Control Project will be kept at a minimum, but the following are necessary:

1. Technical Progress Report - The technical advisor will prepare a technical progress report on a weekly or ten-day basis. This report is intended for the project director, Regional Forester, and others. It will summarize the larval development and other technical phases of control for that period.

2. Weekly Progress Report - The biologist will submit a brief, informal summary of the plot data collected, progress of spraying operations, and general climatological information for the period covered. This report should be prepared on Friday night and mailed or delivered on an arranged schedule to the technical advisor.

3. Final Report of Entomological Aspects - A final report of the entomological phases of the project will be prepared by the technical advisor and the project biologist as soon as possible after the completion of the project.

APPENDIX

Notes for the Biologist and Assistant Biologist

Biology and Habits of the Western Hemlock Looper

Spot Checks

Field Rearing

Labeling

Coding

Equipment for Technical Personnel

Forms

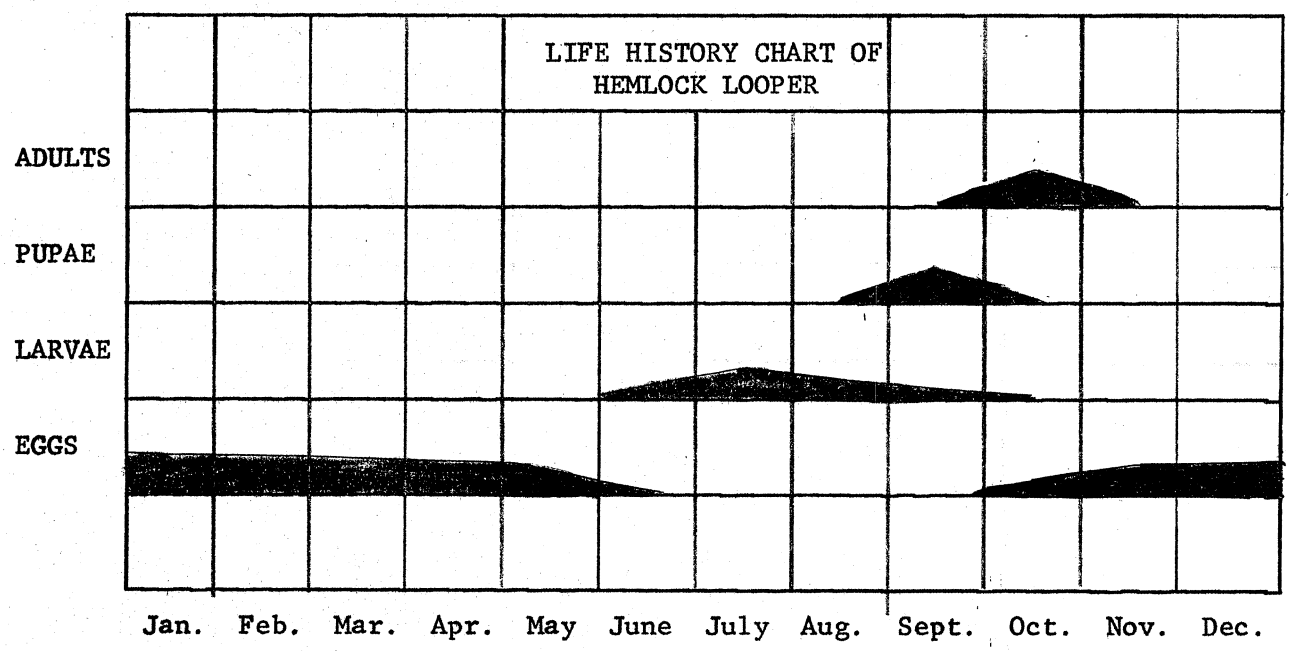
NOTES FOR THE BIOLOGIST AND ASSISTANT BIOLOGIST

This section is designed as a working guide for the biologist and assistant biologist during the control project. The information included in this section will aid them in choosing the proper time to release the individual spray blocks and in training insect checkers in the preparation of forms and vial labels.

A. Biology and Habits of the Western Hemlock Looper

The hemlock looper overwinters in the egg stage. The eggs hatch the following spring. The newly-hatched caterpillars are about one-fourth inch long. These young larvae crawl up the tree trunks and begin feeding on young needles in the lower crown; however, some larvae feed on ground vegetation before migrating to the western hemlock, Douglas-fir, and Sitka spruce foliage. First feeding commences in May, June, and early July, but the more noticeable feeding occurs from the middle of July to October. Caterpillars drop to the ground in August and September and pupate in protected places, such as bark crevices or under debris on the ground. The moths appear, mate and lay eggs in late September and October. 4/

The following life history chart is from an office report written by Beal in 1933. 5/ This life history was determined from studies in southwestern Washington. The development of the hemlock looper in Clatsop County should be similar.



4/ Keen, F.P. Insect Enemies of Western Forests. U.S. Dept. of Agric., Misc. Pub. 273, 280 pp., illus. (Rev.) 1952.

5/ Beal, J.A. Unpublished Progress Report - Further Studies on the Hemlock Looper in Southwestern Washington. 1933. 42 pp. (U.S. Dept. of Agric., Bureau of Entomology; Forest Insect Investigations, Portland, Oregon.) (Typed.)

The material included in the following table was extracted from Beal's 1933 report and should be used as a guide in determining larval instars.

Instar	Head Capsule Width (MM)	Color	
		Head	Body
I	.36-.47	Dark brown to black	Alternating dark and light gray bands
II	.58-76	Dark	Alternating bands less distinct
III	.89-1.18	Mottled brown and gray	Bands appear only as dark spots showing mainly on the sides of the larva
IV	1.29-1.76	Blends with body color	Body markings less uniform with wide variations of gray and brown predominating
V	1.91-2.56	Blends with body color	Body markings variable; color patterns not at all uniform

B. Spot Checks

To obtain additional looper developmental data, if necessary, random spot checks will be made when the time for spray block release approaches. Insect checkers will collect 50 larvae from beatings of understory foliage. These larvae will be preserved in alcohol and submitted to the biologist or assistant biologist for separation by instars. The biologist will determine when and where spot checks need to be made.

C. Field Rearing

A field rearing station will be set up within the stand bordering Moos Moos Creek. Larvae will be reared on potted western hemlock seedlings to see if the development at the field station and at the collection points is the same. The biologist or assistant biologist will examine the rearings every one or two days.

D. Labeling

It is extremely important that the vials of insects collected

from the various collection points be labeled clearly, neatly, and completely. All labels must be of white paper and only a soft pencil or India ink pen should be used to record the vital information. Do not use ballpoint pens.

The following information should be included on all labels:

1. Control unit
2. Collection point number
3. Date of collection
4. Collector's initials

E. Coding

The following code will be used on labels and forms to facilitate the handling of data on the 1962 looper control project.

Control Unit:
- Clatsop = C
- Youngs River = YR
- Astoria = A
- Gnat Creek = GC

Type of Sample:
- Collection Point = CP
- Spot Check = SC
- Mortality Plot = MP

Numbering will run consecutively for each type of sample in each control unit as follows:

CCP-1 = Clatsop control unit collection point #1
YRSC-1 = Youngs River control unit spot check #1
GCMP-1 = Gnat Creek control unit mortality plot #1

EQUIPMENT FOR TECHNICAL PERSONNEL

	Biologist	Assistant Biologist	Insect Checkers	Total
1. Laboratory Equipment				
Alcohol, Ethyl (95%)	1 gal.			1 gal.
Binocular Microscope	1	1		2
Brush, Camel's Hair	2	1		3
Corks:				
#2	2 gross			2 gross
#10	3 gross			3 gross
Desk Lamp (Fluorescent)	1			1
Dissecting Needles	6	6		12
Extension Cords	2			2
File Boxes, 3" x 5"	1	1		2
File Boxes, 5" x 8"	1	1		2
Forceps	2	2		4
Graduate (250 Ml.)	1			1
Insect Pins (No. 3)	1 pkg.			1 pkg.
Microscope Grid	1			1
Microscope Lamp	1			1
Petri Dish	1	1		2
Pipettes (Eyedroppers)	2	1		3
Tape, Masking (1" Width)	1 roll			1 roll
Vials:				
25 x 95 mm.	1 gross			3 gross
12 x 75 mm.	1 gross	1 gross		2 gross
Vial Racks:				
25 x 95 mm.	1	1		2
12 x 75 mm.	1			1
Wash Bottles				
1 liter	1			1
500 Ml.	1	1		2
Wash Glasses (Syracuse)	2	2		4
2. Field Equipment				
Altimeter	1	1		2
Axes	1	1		2
Binoculars	1			1
Canteen (1 gal.)	1	1		2
Climbing Spurs and Belts	1 set			1 set
Collecting Cloth	1	1	1	5
Compass, Pocket	1	1	1	5
Dissecting Needles			2	6
First Aid Kits	1	1		2
Forceps			2	6
Hand Lenses	1	1		2
Hard Hats	1	1		2
Pipettes (Eyedroppers)			1	3
Pruners, Hand	1	1	1	5
Pruners, Pole			1	3
Spray Paint (Pressurized)	6 cans	6 cans	8 cans	36 cans
Stamp, Serial Numbering	1			1

	Biologist	Assistant Biologist	Insect Checkers	Total
2. Field Equipment (Continued)				
Tally Register	1	1	1	5
Tape (Plastic Flag)	2 rolls	1 roll	1 roll	6 rolls
Tatum Holder (8" x 10")	1	1	1	5
Tree Tags	100	100	100	500
Vehicle (Power Wagon)		1		1
Vehicle (Sedan-Del.)	1			1
3. Supplies				
Control Plan	1	1		2
Control Unit Map	1	1	1	5
Diary Forms	75	50		125
Form R6-5240-31	20	20	20	100
Form R6-5240-32	60			60
Form R6-5240-33	15			15
Form R6-5240-34	10		30	100
Form R6-5240-35	15			15
Franked Envelopes	50			50
Notebook, 3" x 5"	2	2	2	10
Notebook, 5" x 8"	1	1		2
Office Box	1			1
Paper Clips	1 box			1 box
Pen, Ballpoint	2	2	1	7
Pencils	3	3	3	15
Purchase Order Book	1			1
Spray Deposit Cards	300	300	300	1,500
Spray Deposit Index	1			1
Tablets	2	2	1	7
Tape, Scotch	1 roll	1 roll		2 rolls
Technical Direction Plan	1	1	1	5
Time Report Forms	14			14
USGS Quadrangle Sheets	1 set	1 set		2 sets

PRE-SPRAY LARVAL COLLECTION FIELD FORM

WESTERN HEMLOCK LOOPER

CONTROL UNIT _____ COLLECTION POINT NUMBER _____

SPRAY BLOCK _____ COLLECTOR _____

Date	Number of Larvae by Tree and Direction																				Total Larvae	Number of Larvae by Beating					Total Larvae
	Tree 1				Tree 2				Tree 3				Tree 4				Tree 5					1	2	3	4	5	
	N	E	S	W	N	E	S	W	N	E	S	W	N	E	S	W	N	E	S	W							

Form R6-5240-31 (5/62)

WESTERN HEMLOCK LOOPER LARVAL

DEVELOPMENT RECORD

CONTROL UNIT _____ SPRAY BLOCK NO. _____ COLLECTION POINT NO. _____

SECTION _____ TNP. _____ RGE. _____ COLLECTOR _____

BLOCK RELEASED _____ SPRAYING BEGUN _____

Collection Date	LARVAL INSTARS										Pupae		Total
	I		II		III		IV		V				
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	

Form R6-5240-32 (5/62)

SUMMARY OF WESTERN HEMLOCK LOOPER

LARVAL DEVELOPMENT

COLLECTION PERIOD _____ DATE SUBMITTED _____ BIOLOGIST _____

Daily Collection				Larval Instars (% of Daily Collection)						
Date	Control Unit	Spray Block	Collection Point Number	I	II	III	IV	V	Pupae	Total

R6-5240-33 (5/62)

WESTERN HEMLOCK LOOPER MORTALITY RECORD

SPRAY BLOCK ____________ DATE BLOCK RELEASED ____________ DATE(S) BLOCK SPRAYED ____________

PILOT ____

DATE PLOT COLLECTED BEFORE SPRAYING ____________ DATE PLOT COLLECTED AFTER SPRAYING ________

Collection Point No.	Tree No.	No. larvae per 18" twig before spraying					Total	No. larvae per 18" twig after spraying					Total
		Branch						Branch					
		1	2	3	4	5		1	2	3	4	5	
	1												
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Form R6-5240-34 (5/62)

HEMLOCK LOOPER CONTROL PROJECT

Notification of Release of Spray Blocks

Date: _____

To: _____, Project Director

From: _____, Biologist

The following described spray blocks will be ready for spraying on _____ (day), _____ (date) in the priority listed below:

Priority	Block No.	Total Acres	Remarks
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Total acreage released by this notice: _____ acres

Unless otherwise stated, the lower elevations of each block should be sprayed first if the period of spraying each block exceeds one day.

Approved: _____
Biologist

If this is a verification of a release by earlier communication, such release was given by me on _____ (date) by _____ communication.

1 copy each to: Project Director
U.S. Forest Service (Div. Timber Mgmt.)
Project Biologist

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